

Atty. Docket No. 7969-01
Appln. No. 10/648,572

REMARKS

Applicants respectfully request reconsideration of the rejections in the Patent Application, particularly in view of following remarks and the attached declaration.

Claims 1-12 and 14 -18 are pending in the application.

The Invention

The invention is a process for the production of HPLC (high performance liquid chromatography) acetonitrile (i.e. highly purified acetonitrile having a UV cutoff for impurities of <190 nm). In liquid chromatography the quality and the reproducibility of the separation depends decisively on the quality of the solvents used. Such solvents require low UV absorbance in order to assure optimum sensitivity. The instant invention is a process which is capable of producing a highly purified acetonitrile solvent having the low absorbance UV required for liquid chromatography applications.

This process as more fully described in the specification and claims of the application is characterized by two key features, (i) operating the three distillation columns in the acetonitrile purification section (of an acrylonitrile plant) under specific reflux ratios, to obtain a highly pure acetonitrile side stream from the third distillation column, and then (ii) passing the highly pure acetonitrile side stream through an acidic ion exchange resin to further purify said highly pure acetonitrile producing highly purified acetonitrile having a UV cutoff for impurities of <190 nm. The claimed reflux ratio parameters are necessary to limit impurities such as acrylonitrile, crotononitrile, and crotonaldehyde. The acidic ion exchange resin is used to limit impurities such as acetamide, oxazole and 2-aminopropionitrile. This combination of treatment steps is necessary in order to obtain the highly purified acetonitrile having a UV cutoff for impurities of <190 nm (i.e. HPLC acetonitrile).

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The Rejections

Claim 1-12 and Claims 14-18 remain rejected under 35 USC 103(a) as being unpatentable over the combination of U.S. Patent 4,362,603 to Presson et al., German patent DD 259 530 to Schaller et al. and US patent 3,313,726 to Campbell et al. Applicants' respectfully traverse.

Presson et al. discloses a distillation procedure for acetonitrile and alleges 99+% purity of acetonitrile. However, this purity is insufficient to meet the stringent HPLC (high performance liquid chromatography) acetonitrile specification of Applicants' claimed process. Presson produces material by a first stage purification that is unacceptable for the HPLC acetonitrile specification (*see*, page 4, lines 11-14). The Examiner states that Presson does not teach a reflux stage. Presson et al. issued as a patent in 1982. Applicants' reflux ratios produce a material that is suitable for ion exchange purification to result in HPLC grade acetonitrile which is patentably distinct over the material of Presson et al. The Examiner has suggested that the difference between the instantly claimed purity of 99.97% and the 99.8% of Presson et al is not patentably distinct. A Declaration from Dr. Mark C. Cesa is submitted with this Amendment. This Declaration is discussed in greater detail below, but in part this Declaration attests to a difference in acetonitrile purity between Applicants' claimed process and Presson et al. In short, this difference in purity (if not due to additional water) will likely strongly alter the quality of the acetonitrile (e.g. impact the UV cutoff) and make it unsuitable for applications requiring HPLC acetonitrile. One skilled in the art and motivated by the teachings of Presson would not seek to modify Presson to arrive at Applicants' claimed distillative recovery/ion exchange resin treatment process.

The Examiner cites Campbell et al. for allegedly teaching the use of ion exchange resins for treating liquid solutions of chemicals. This is a very broad teaching and Campbell et al. discloses purifying adiponitrile and not acetonitrile. Further, Campbell et al. teaches way from Applicants' process since such processes are **deterred** greatly because of the inability to regenerate resin (*see*, column 1, lines 17-23).

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The Examiner cites Schaller et al. for an alleged ultrapurification process for the production of acetonitrile. Schaller et al. teaches using potassium permanganate as an oxidizing agent followed by an additional purification step. Schaller et al. teaches only one distillation column and one reflux ratio. Additionally, the distillate from the column is stripped with an inert gas (e.g. nitrogen). Schaller et al. does not teach or suggest Applicants' claimed three column process. Applicants' do not use an inert gas to strip the distillate. Further, Schaller et al. teaches a product with UV wavelengths of 200-300 nm (see, Abstract). This is not as pure as Applicants' claimed product which has a UV cutoff of less than 190 nm.

The Cesa Declaration

Attached hereto is a Declaration under 37 CFR § 1.132 by Dr. Mark C. Cesa, one of the named inventors in the instant application. The Declaration and the data contained therein are offered to show three main points:

- (1) The difference between Applicants' claimed purity of 99.97% and the 99.8% of Presson et al. is significant;
- (2) The effect of operating the acetonitrile distillation scheme within the claimed reflux ratios offers significant improvement in product quality; and
- (3) The combination of (i) operating the three distillation columns under specific reflux ratios, to obtain a highly pure acetonitrile from the third distillation column, and then (ii) passing the highly pure acetonitrile through an acidic ion exchange resin, is necessary to produce highly purified acetonitrile having a UV cutoff for impurities of <190 nm.

No Prima Facie Case of Obviousness

The Examiner has the burden to establish a prima facie case of obviousness of the pending claims over the cited references. *In re Oetiker*, 24 U.S.P.Q. 2d 1443 (Fed. Cir. 1992). The Federal

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Circuit has held that in order for an invention to be obvious over the prior art, two things must be found in the prior art, and not in Applicants' disclosure: (i) the suggestion of the invention, and (ii) the expectation of success. *In re Vaeck*, 20 U.S.P.Q. 2d 1438, 1442 (Fed. Cir. 1991). The combination of Presson et al., Schaller et. al. and Campbell et al. does not suggest the invention for the following reasons.

- (1) Applicants' process produces a product with an ultraviolet cutoff of < 190 nm wavelength. None of the cited references produce or teach such a product. Schaller et al. is closest with acetonitrile having a UV cutoff in the 200-300 nm wavelength, but this is achieved by a much different process.
- (2) There is no teaching in Presson et al. or Schaller et al. of Applicants claimed reflux ratios. Nor is there any teaching or suggestion in the cited references which would support a reasonable expectation of the benefits provided by the reflux ratios. Schaller et al. does not teach a multiple column acetonitrile distillation process and teaches a reflux ratio for only a single distillation column.
- (3) There is no teaching or suggestion to combine the distillation process of Presson et al. with the resin treatment of Campbell. Nor is there any teaching or suggestion in the cited references which would support a reasonable expectation of the benefits provided by the claimed combination. Further, Applicants' claimed combination (which includes specific reflux ratios for the distillation columns) is an advancement offering unexpected benefits well beyond a simple combination of the distillation process of Presson et al. with the resin treatment of Campbell et al.
- (4) There is the explicit acetamide limitation of Applicants' Claim 1 which is not suggested or taught by the combination of cited references. It would not have been routine (not the standard for obviousness) for one skilled in the art to modify the cited references to arrive at a process for making a product with no more than about 0.3 milligrams of acetamide per liter of acetonitrile.

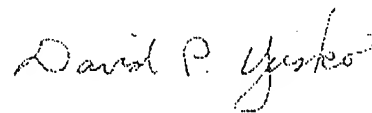
For at least these reasons, Applicants believe that the above remarks overcome this claim rejection. Accordingly, this claim rejection should be withdrawn.

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Conclusion

Applicants believe that they have shown that the claimed invention is not obvious in view of the cited references. As such, the claims, as presented, are in condition for allowance. The Examiner is respectfully requested to withdraw the rejection and forward the application to issuance.

Respectfully submitted,



David P. Yusko
Registration No. 30,817

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3030 Warrenville Road, Suite 650
Lisle, Illinois 60532
TEL (630) 857-7151
FAX (630) 857-7328